STUDIES ON THE CHARACTERISTICS OF HAIR IN SOME INDIAN BATS: (MAMMALIA: CHIROPTERA)[1]

J. H. Sabnis[2]

(With nineteen text-figures)

This paper describes the characteristics of hair of some Indian chiroptera. A series of camera lucida diagrams depicting the hair structure of 19 species of bats is presented. The structural pattern of the hair of bats reveals variations at generic as well as species levels.

Introduction

The present study was undertaken in order to contribute information on the structure of hair in some Indian chiropteran forms in the light of the new method of description suggested by Adorjan and Kolenosky (1969).

Material and methods

The hairs used for the study were from the dorsal side of the body. They were carefully washed in hot water and slides were prepared in Canada balsum after they were air dried thoroughly and passed through ether and xylol. The camera lucida drawings were drawn of each hair showing cuticular and medullar pattern. The proximal, medial and distal regions of the hairs were observed. The measurements given are averages. The diagrams on the left side in the plate show the structure of the hair at proximal end, in the middle the medial and the right the distal end.

Observations

The basic parts of a typical mammalian hair are the cuticle, cortex, medulla, pigment and hair cells. In the system of hair identification to be outlined only cuticle and medulla are important. The structure of these patterns which form the basis of hair indentification under study are given according to order and family of the specimens. They are arranged according to order and families of the species as given by Simpson (1945).

Family Pteropidae

Cynopterus sphinx gangeticus (Fig. 1)

Gross appearance:

Length 8 mm. Hair stem soft and slender. Colour greyish, basally white, diameter of proximal region 24 μ.

Microscopic appearance:

Hair nodular with corollar serrate edges in the proximal region and the medial region. Borders appear spiny distally. Medulla continuous in the proximal region but fragmented having a beaded appearance in the medial region.

Rousettus leschenaulti (Fig. 2)

Gross appearance:

Length 4 mm. Hair stem soft. Colour white in the proximal region followed by chocolate grey in the middle region; distal region yellow. Diameter at the proximal region 15 μ.

[1] Accepted May 1979.

[2] Department of Zoology, Vidharbha Mahavidyalaya, Amravati-444 604.

Microscopic appearance:

Scales are corollary with spinulate borders in the proximal and medial regions. Distal region borders appear serrate. Hair non-medullated.

Pteropus giganteus giganteus (Fig. 3)

Gross appearance:

Length 1.2 cm. Colour white at the proximal region; brown in the medial region and greyish yellow in the distal region. Some hairs are pure black. Hair stems narrow at proximal becoming a little broader in the medial and tapering in the distal region. Diameter at the proximal region 18 μ.

Microscopic appearance:

Scales imbricate with crenate borders in the proximal and the medial region. In the distal region the border appears serrate. The medulla is not visible in the proximal region and the distal region, but it is fragmented in the middle region.

Family RHINOPOMATIDAE

Rhinopoma hardwickei (Fig. 4)

Gross appearance:

Length 5 mm. Hairs slender and soft. Hairs differ in colour, some being black and some brown. They measure 12 μ in diameter in the proximal region.

Microscopic appearance:

Scales of corollary type with three to four dentate spines on their borders in the proximal and medial regions. Distal region spiny. Medulla fragmented proximally, while it has a beaded appearance in the medial region. Medulla not visible distally.

Family EMBALLONURIDAE

Taphozous perforatus (Fig. 5)

Gross appearance:

Length 6 to 7 mm. Hair stems soft and slender. Colour of hair white in the proximal region and black in the medial region. The remaining distal part is grey. Diameter of the hair at the proximal region 21 μ.

Microscopic appearance:

Hairs are nodular with corollary serrate borders in the proximal region, and dentate in the medial region. Distal region spiny. Pigment uniformly distributed along the border of the hair but central area appears lightly coloured. Hairs are of the non-medullated type.

Taphozous melanopogon (Fig. 6)

Gross appearance:

Length 6 mm. They measure 12 μ in diameter at the proximal region. Colour of hair greyish white in the proximal region, brown medially and white tipped.

Microscopic appearance:

Hairs nodular with corollar serrate borders in the proximal and medial region. Borders of the distal region dentate. Pigment of hair localised at the nodular girdle. Hair is of the non-medullated type.

Taphozous longimanus (Fig. 7)

Gross appearance:

Length 6 mm. Hairs slender and soft. Hair distally and proximally black; grey in the medial region. Measure 12 μ in diameter at the proximal region.

Microscopic appearance:

Hair nodular with spinulate borders in the proximal region and dentate in the medial region. Distal region with a serrate border. Pigment uniformly distributed. The hair is of the non-medullated type.

Taphozous theobaldi (Fig. 8)

Gross appearance:

Length 5 to 7 mm. Hair stems soft and slender. Diameter of the proximal region 12 μ. Colour of hair white in the proximal

region, and dark chocolate brown in the medial and distal regions.

Microscopic appearance:

Hairs nodular with corollar serrate borders. Pigment distributed in the inter-nodular area; nodular girdle lightly coloured. The hair is of the non-medullated type.

Taphozous kacchensis (Fig. 9)

Gross appearance:

Length 2 to 3 mm. Measure 21 μ in diameter proximally. Proximal one third of the hair white, remaining section black.

Microscopic appearance:

Hairs nodular with corollar serrate scales. Internodular areas pigmented in such a way that the dark rectangular patches are localised on either side of the centrally lighter coloured area. Hair is of the non-medullated type.

Family MEGADERMATIDAE

Megaderma lyra lyra (Fig. 10)

Gross appearance:

Length 8 mm. Measure 9 μ at the proximal region. Colour of hair in the proximal region white, remaining areas greyish black.

Microscopic appearance:

The hairs are nodular, corollar dentate in the proximal region, medially serrate, but in the distal region it appears spiny. The medulla in the proximal region appears continuous but in the medial region it is fragmented beaded type. In the distal region the medulla is not visible.

Family RHINOLOPHIDAE

Rhinolophus lepidus lepidus (Fig. 11)

Gross appearance:

Length 4 mm. Colour of hair white in the proximal region gradually changing to yellowish grey in the medial region, distally light brown. The hair measures 9 μ at the proximal end.

Microscopic appearance:

Hairs nodular with corollar dentate borders. Nodular pattern uniform throughout except in the proximal region which has sympodial nodular arrangement. The hair stems are of the non-medullated type.

Family HIPPOSIDERIDAE

Hipposideros fulvus fulvus (Fig. 12)

Gross appearance:

Length 4 mm. Hair stems soft and slender. Colour of hair, white in the proximal region, medially greyish brown and distally black. Diameter of the proximal region 9 μ.

Microscopic appearance:

Hair appears nodular with corollar pattern with serrate borders in the proximal and medial regions. Nodes reduced in size in the distal region which appears pointed. Hairs stems are non-medullated.

Hipposideros cineraceus (Fig. 13)

Gross appearance:

Length 4 mm. Hair stems slender. Colour of hair half yellow and half chocolate brown. Diameter of proximal region, 12 μ.

Microscopic appearance:

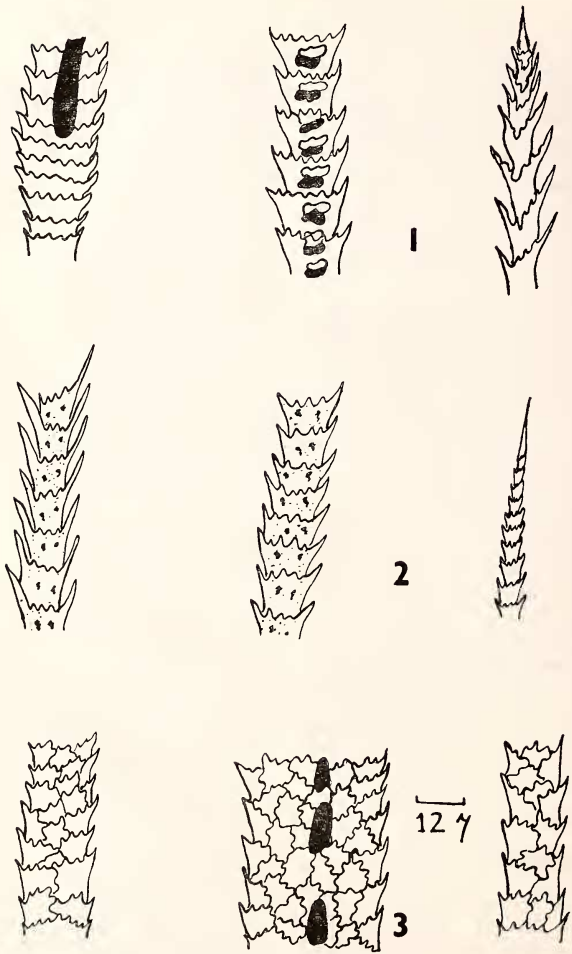
Hairs appear nodular with corollar scale pattern, the borders of which appear plain in the proximal and medial regions. In the distal region the corollar borders are serrate. Hair stems are non-medullated.

Family VESPERTILIONIDAE

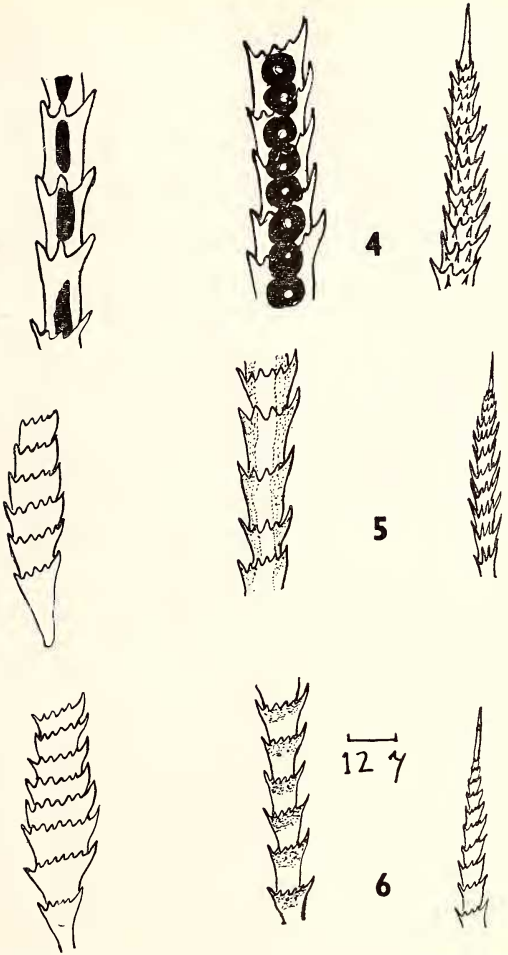
Pipistrellus coromandra (Fig. 14)

Gross appearance:

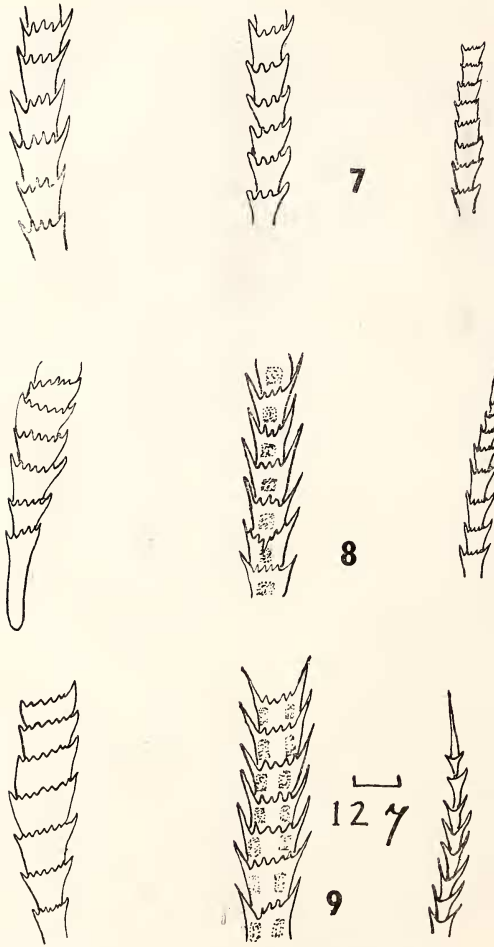
Length 6 mm. Colour of hair yellow proximally, middle two third dark chocolate and remaining portion yellowish brown. Diameter



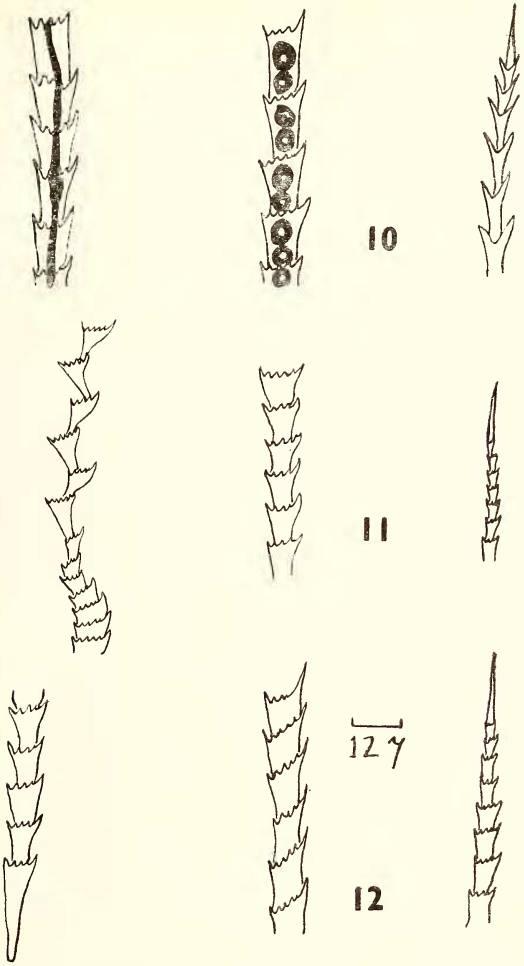
Diagrammatic representation of hair structure of bats in 1. *Cynopterus sphinx*, 2. *Rousettus leschenaulti*, 3. *Pteropus giganteus giganteus*.



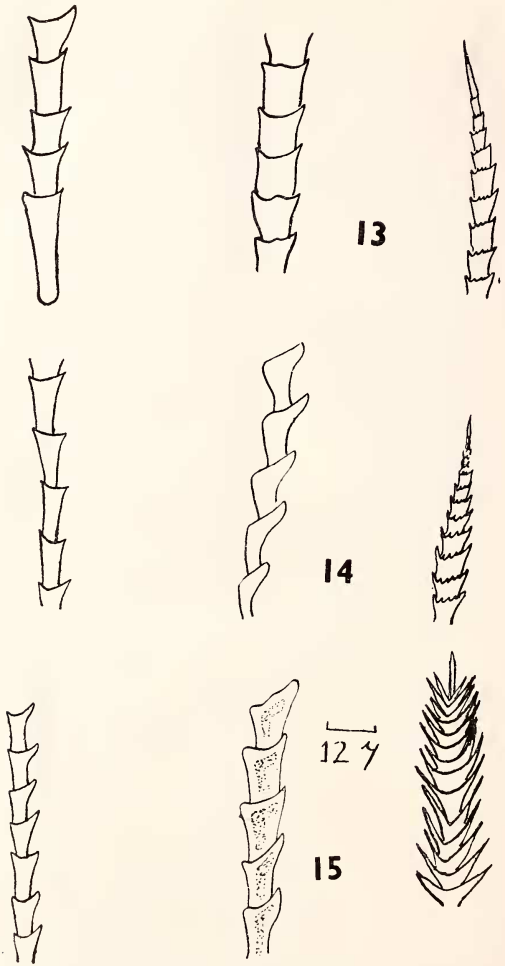
Diagrammatic representation of hair structure of bats in 4. *Rhinopoma hardwickei*, 5. *Taphozous perforatus*, 6. *Taphozous melanopogon*.



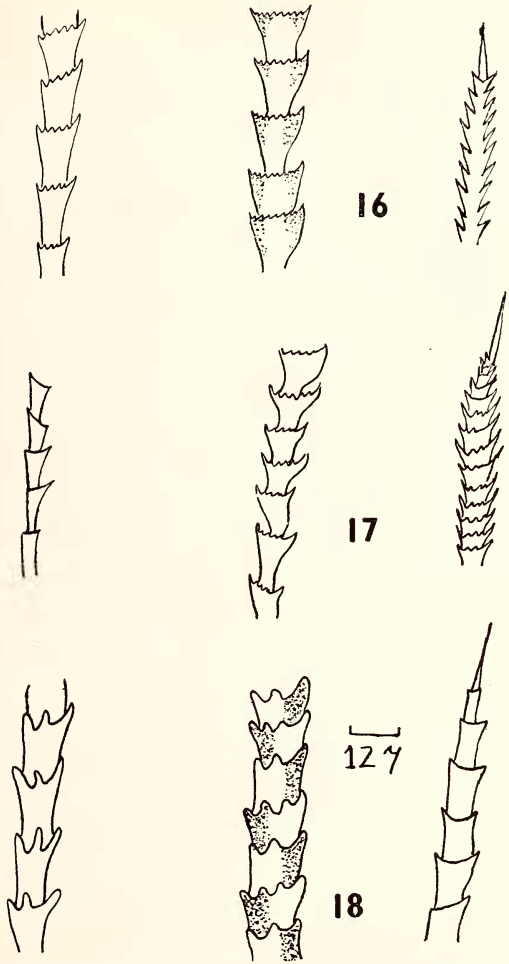
Diagrammatic representation of hair structure of bats in 7. *Taphozous longimanus*, 8. *Taphozous theobaldi*, 9. *Taphozous kacchensis*.



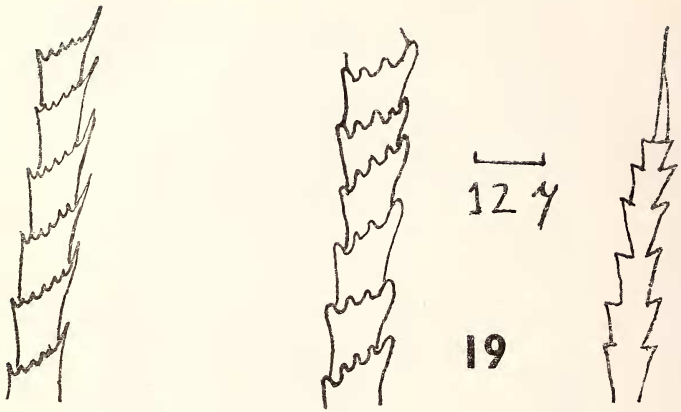
Diagrammatic representation of hair structure of bats in 10. *Megaderma lyra lyra,* 11. *Rhinolophus lepidus lepidus,* 12. *Hipposideros fulvus fulvus.*



Diagrammatic representation of hair stucture of bats in 13. *Hipposideros cineraceus*, 14. *Pipistrellus coromandra*, 15. *Pipistrellus mimus*.



Diagrammatic representation of hair structure of bats in 16. *Pipistrellus ceylonicus*, 17. *Pipistrellus dormeri*, 18. *Scotophilus temmincki*.



Diagrammatic representation of hair structure of bats in 19. *Scotophilus heathi.*

at proximal region, 9 μ.

Microscopic appearance:

Hairs nodular with plain borders in the proximal and medial regions. Distal region spiny. Hair stems non-medullated.

Pipistrellus mimus (Fig. 15)

Gross appearance:

Length 4 to 5 mm. Colour of the first two thirds black; and remaining one third, grey. Diameter at the proximal region 9 μ.

Microscopic appearance:

Hairs nodular with corollar scales having plain borders in the proximal and medial regions. Distal tip has the shape of a wheat grain. Pigment localised in the inter-nodular area.

Pipistrellus ceylonicus (Fig. 16).

Gross appearance:

Length 5 mm. Colour of hair white proximally, gradually changing to chocolate medially. Distal region light brown. Diameter of the hair at the proximal region 9 μ.

Microscopic appearance:

Hairs nodular with corollar serrate scales in the proximal and medial regions. Distal region spiny. Pigment localised in the nodular area. Hairs non-medullated type.

Pipistrellus dormeri (Fig. 17)

Gross appearance:

Length 5 mm. Colour of hair, uniform grey. Diameter at the proximal region 9 μ.

Microscopic appearance:

Hairs nodular with corollar scales having plain borders in the proximal region, gradually changing to serrate scales medially. The borders appear dentate distally. Hair stems non-medullated.

Scotophilus temmincki (Fig. 18)

Gross appearance:

Length 4 mm. Colour of hair white in the

proximal region and brown in the distal region. In the medial region the white band is separated by yellow band on either side. Diameter at the proximal region 12 μ.

Microscopic appearance:

Hairs nodular with corollar dentate scales having three to four denticles in the proximal and medial regions. In the distal region corollar surface plain ending in a pointed tip. Pigment distributed at inter-nodular area on either side alternately. Hair stems non-medullated.

Scotophilus heathi (Fig. 19)

Gross appearance:

Length 3 mm. Colour of hair brownish yellow proximally and black distally, but is brown in the medial region. Diameter at the proximal region 12 μ.

Microscopic appearance:

Hairs nodular with corollar serrate scales in the proximal region, gradually changing to dentate in medial region. The distal borders of the hair appear serrate.

Conclusion

According to the nature of the structure of the chiropteran hair is of two types. The hairs of *Cynopterus sphinx*, *Pteropus giganteus giganteus*, *Rhinopoma hardwickei* are of the medullated type, while those of *Rousettus*, *Taphozous*, *Pipistrellus* and *Scotophilus* species are of non-medullated type.

From the point of view of the scale patterns the hairs of bats may be roughly divided into two kinds—the nodular corollar type and the imbricate type. The megachiropteran forms *Cynopterus sphinx* and *Rousettus leschenaulti* have corollar type of scales, while *Pteropus giganteus giganteus* showed the presence of imbricate crenate type of scales. All the genera and species which belong to families of Rhinopomatidae, Emballonuridae, Megadermatidae, Rhinolophidae, Hipposideridae, and Vespertilionidae showed corollar type of scales.

The families Pteropidae, Rhinopomatidae and Megadermatidae show common medular corollar hair structure, while non-medullated corollar scales are characteristic feature, for the majority of Microchiropteran forms studied. The structural hair pattern of *Pteropus giganteus giganteus* is entirely different from that of other chiropteran forms investigated. It is medullated with imbricate crenate types of scales.

Acknowledgement

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References

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